IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	10/028,730 Confirmation No. 4112
Applicant	:	Michael Collins et al.
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TC/A.U.	:	3746
Examiner	:	Michael Koczo, Jr.
Docket No.	:	00-682
Customer No.:		34704

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313

Corrected Appeal Brief

Dear Sir:

This Corrected Appeal Brief is submitted responsive to a Notification of Non-Compliant Appeal Brief which was mailed on August 17, 2007. This Appeal Brief is in support of the Notice of Appeal which was filed on February 23, 2007 and is accompanied by an extension of time to extend the period for filing the brief to and including July 23, 2007.

Table of Contents

(i) Real party in interest - The real party in interest in this appeal is the assignee, Carrier Corporation.

(ii) Related appeals and interferences - none.

(iii) Status of claims - Claims 1-42 are in the application. Claims 8-16, 25 and 33-36 have been withdrawn from consideration. Claims 1-7, 17-24, 26-32 and 37-42 are rejected and are the claims on appeal.

(iv) Status of amendments - There are no responses filed in this application after the final rejection, and there are therefore no un-entered amendments.

(v) Summary of the claimed subject matter - The claims on appeal include independent claims 1, 4, 17, 20, 24 and 29.

Independent claim 1 calls for an apparatus for monitoring a compressor (10, Figure 1), comprising: a plurality of sensor inputs for receiving input regarding operating parameters of a compressor (See inputs connected to elements 16, 18, 20, 22, 24, and 26, Figure 1, See also specification page 3, line 24 through page 4, line 11); at least one control action output for sending a control action to said compressor (elements 28, 30, 32, 34, Figure 1, see also specification page 4, lines 4-11); and a control member (14, Figure 1, see also specification page 4, lines 12-21) communicated with said plurality of sensor inputs and said control action output, said control member being adapted to analyze input from said plurality of sensor inputs, to determine a control action based upon said input and to send said control action to said at least one control action output (See specification page 4 lines 12-21 and example on page 4, lines 22-28), wherein said control action includes actions for immediate protection, wherein a control action to shut down said compressor is issued, and control actions for prognostic protection, wherein a signal indicating that maintenance is needed is issued while said compressor is continued to be operated (See specification, page 4, lines 12-28).

Independent claim 4 calls for an apparatus for monitoring a compressor (10, Figure 1), comprising: a plurality of sensor inputs for receiving input regarding operating parameters of a compressor (See inputs connected to elements 16, 18, 20, 22, 24, and 26, Figure 1, See also specification page 3, line 24 through page 4, line 11); at least one control action output for sending a control action to

said compressor (elements 28, 30, 32, 43, Figure 1, see also specification page 4, lines 4-11); and a control member (14, Figure 1, see also specification page 4, lines 12-21) communicated with said plurality of sensor inputs and said control action output, said control member being adapted to analyze input from said plurality of sensor inputs, to determine a control action based upon said input and to send said control action to said at least one control action output (See specification page 4 lines 12-21 and example on page 4, lines 22-28), wherein said control member is adapted to receive input comprising compressor discharge pressure, compressor discharge temperature, compressor suction pressure, compressor suction temperature, oil pressure and a compressor on/off input signal (See specification, paragraph spanning page 3-4), wherein said control member includes a memory storing a plurality of potential control actions, a plurality of adjustable operating parameters and a plurality of sensor input value combinations corresponding to said plurality of potential control actions (specification page 4, lines 12-21), and a processor (14, Figure 1) adapted to compare said input to said sensor input value combinations and select said control action from said plurality of control actions, wherein said plurality of potential control actions includes a compressor shut down command, operation parameter adjusting commands and commands indicating that maintenance is needed.

Claim 17 calls for a method for monitoring a compressor 10, comprising the steps of: obtaining input regarding a plurality of compressor operating parameters; feeding said input to a control

member; analyzing said input with said control member to determine a control action based upon said input; and carrying out said control action on said compressor, wherein said control action includes actions for immediate protection, wherein a control action to shut down said compressor is issued, and control actions for prognostic protection, wherein a signal indicating that maintenance is needed is issued while said compressor is continued to be operated (See specification page 6, lines 3-19).

Claim 20 calls for a method for monitoring a compressor, comprising the steps of: obtaining input regarding a plurality of compressor operating parameters; feeding said input to a control member; analyzing said input with said control member to determine a control action based upon said input; and carrying out said control action on said compressor, wherein said plurality of potential control actions include a compressor shut down command, operation parameter adjusting commands and commands for indicating that maintenance is needed, wherein said input comprises compressor discharge pressure, compressor discharge temperature, compressor suction pressure, compressor suction temperature, oil pressure and a compressor on/off input signal, wherein said control member includes a memory storing a plurality of potential control actions and a plurality of sensor input value combinations corresponding to said plurality of potential control actions; and wherein said control member selects said control action from said plurality of potential control actions, wherein said plurality of potential control actions include a compressor shut down command, operation parameter adjusting commands and commands for

indicating that maintenance is needed (See specification page 6, lines 3-19 and line 20 through page 7, line 2).

Claim 24 calls for, in combination, a compressor and control module system, comprising: a compressor 10; and a control module 12 (See Figure 1) comprising a plurality of sensor inputs for receiving input from said compressor (Elements 20-26, see also specification page 3, line 24 through page 4, lines 11); at least one control action output for conveying control actions to said compressor (Elements 28, 30, 32 and 34, Figure 1, See also specification page 4, lines 4-11); and a control member (14, Figure 1, See also specification page 4, lines 12-21) communicated with said plurality of sensor inputs and said control action output, said control member being adapted to analyze input from said plurality of sensor inputs, to determine a control action based upon said input and to send said control action to said at least one control action output (See specification page 4, lines 12-21 and example on page 4, lines 22-28), wherein said control action includes actions for immediate protection, wherein a control action to shut down said compressor is issued, and control actions for prognostic protection, wherein a signal indicating that maintenance is needed is issued while said compressor is continued to be operated (See specification page 4, lines 12-28).

Claim 29 calls for, in combination, a compressor 10 and control module system (12, Figure 1) comprising a plurality of sensor inputs for receiving input from said compressor (Elements 20-26, see also specification page 3, line 24 through page 4, lines 11); at least one control action output for conveying control actions to said compressor

(Elements 28, 30, 32 and 34, Figure 1, See also specification page 4, lines 4-11); and a control member (14, Figure 1, See also specification page 4, lines 12-21) communicated with said plurality of sensor inputs and said control action output, said control member being adapted to analyze input from said plurality of sensor inputs, to determine a control action based upon said input and to send said control action to said at least one control action output (See specification page 4, lines 12-21 and example on page 4, lines 22-28), wherein said control member includes a memory storing a plurality of potential control actions and a plurality of sensor input combinations corresponding to said plurality of potential control actions, wherein said plurality of potential control actions include a compressor shut down command, operation parameter adjusting commands and commands for indicating that maintenance is needed (See specification page 4, lines 12-28).

(vi) Grounds of rejection to be reviewed on appeal - The grounds of rejection on appeal are:

(1) The rejection of claims 37-40 under 35 USC 112, first paragraph;

(2) The rejection of claims 1, 2, 3, 17 and 24 under 35 USC 102(b) as anticipated by Gunn et al.;

(3) The rejection of claims 6, 7, 18, 19, 21-23, 26-28 and 30-32 as obvious over Gunn et al. in view of Kauffman et al.; and

(4) The rejection of claims 4, 5, 20 and 29 as obvious over Gunn et al. in view of Allison et al.

(vii) Argument -

Ground 1

In the aforesaid action, the Examiner rejected claims 37-40 under 35 USC 112, first paragraph. The Examiner supports this rejection stating that these claims call for a system control box, and asserts that the specification fails to clearly describe the function of the system control box. The Examiner indicates that it must be clear in what manner the commands are enacted and/or processed, and that it would impose an undue burden on one of ordinary skill in the art to make and use the invention using such a system control box.

The present invention is drawn to a compressor protection module which obtains and analyzes input from the compressor and uses that input to select certain control commands to be issued to the compressor. The system control box is described in the specification, for example at page 6, lines 3-7. There, it is disclosed that:

> Still referring to Figure 1, module 12 may advantageously be communicated with a system control box 40 such that commands issued by processor 14 can be enacted on the compressor, for example to change operating speed, turn off power, control crankcase heater operation, and the like (spec. page 6, lines 3-7).

In light of the above disclosure, it is clear that nothing more is needed in the disclosure. The invention does not relate to the type of specific details that are found missing by the Examiner. The current inventors do not claim to have invented a specific manner in which commands are enacted or processed, and it is submitted that the present disclosure, showing a control box connected with the processor and various inputs and outputs, would certainly enable a person skilled in the art to make and use the invention including the system control box.

The specification is clearly enabling for the invention as claimed, and this rejection should be overturned.

Ground 2

In the second ground of rejection and appeal, the Examiner rejected claims 1, 2, 3, 17 and 24 as anticipated by U.S. Patent No. 5,820,352 to Gunn et al.

In accordance with the present invention, a system and method are provided whereby specific sensor input is obtained from a compressor during operation, and this input is fed to a protection module which is adapted to detect conditions requiring immediate and/or prognostic actions.

In instances where immediate protection is needed, the compressor can be shut down. In other conditions, prognostic protection is appropriate and operation of the compressor can be continued, perhaps at different operating parameters, while a call for maintenance is issued so that the problem can be addressed without interruption of the compressor. It is submitted that Gunn et al. do not at all teach this subject matter, and therefore that Gunn et al. do not anticipate independent claims 1, 17 or 24.

In a preferred embodiment, the invention is provided as a module for communicating with an existing compressor to provide the desired protection. Thus, the present invention contemplates modular and after-market applications which are not possible with hard wired or integrated systems such as the teaching of Gunn et al. This is called for in claim 24.

Gunn et al. teach a detailed process for controlling discharge pressure. Any similar subject matter to that of present claim 24 is hard wired or integrated into the system of Gunn et al., with no suggestion of adaptation to the scope of the present claims on this feature.

Independent claim 24 of the present invention is drawn to a system and apparatus wherein the desired protection is incorporated into a module, rather than hard wired into a particular system or the like. This allows for aftermarket installations and is a distinction from the art of record which is not disclosed or suggested by same.

Ground 3

For claims 6, 7, 18, 19, 21-23, 26-28 and 30-32, these claims all depend directly or indirectly from independent claims discussed in Grounds 1 and 2 above.

Ground 4

For claims 4, 5, 20 and 29, the Examiner indicates that Gunn et al. do not teach commands for indicating that maintenance is needed, and instead relies upon Allison as teaching a system for determining when the next ***scheduled maintenance*** should occur (emphasis added). Each of these claims contains subject matter different from what is taught by the combination of references. Specifically, the commands called for in claim 4 are selected after comparing the claimed input to the claimed sensor input value combinations. The input in question includes compressor discharge pressure, compressor discharge temperature, compressor suction pressure, compressor suction temperature, oil pressure and a compressor on/off input signal. Clearly, one would not rely upon such input to determine the next "scheduled maintenance" for a device. Rather, the input used according to the invention is useful for unscheduled maintenance, that is, for monitoring the compressor and calling for maintenance when needed.

Claim 5 depends from claim 4 and is supported by the above argument.

Claim 20 contains the same limitations as claim 4, and also therefore is supported by the above argument.

Claim 29 does not specify what the input is in as much detail as the other claims. Nevertheless, the control action to be used is still determined based upon input from sensor inputs, which is different from the determination of scheduled maintenance discussed by Allison et al.

Thus, claims 4, 5, 20 and 29 are not obvious based upon the combination of references adopted by the Examiner, and these rejections should be reversed.

An earnest and thorough attempt has been made by the

undersigned to resolve the outstanding issues in this case and place same in condition for allowance. If the Examiner has any questions or feels that a telephone or personal interview would be helpful in resolving any outstanding issues which remain in this application after consideration of this amendment, the Examiner is courteously invited to telephone the undersigned and the same would be gratefully appreciated.

Authorizations of a Deposit Account for an extension of time and for filing an appeal brief accompany this paper. It is believed that no additional fee is due in connection with this paper. If, however, any fee is due, please charge same to Deposit Account No. 02-0184.

Respectfully submitted,

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(viii) Claims Appendix

1. An apparatus for monitoring a compressor, comprising:

a plurality of sensor inputs for receiving input regarding operating parameters of a compressor;

at least one control action output for sending a control action to said compressor; and

a control member communicated with said plurality of sensor inputs and said control action output, said control member being adapted to analyze input from said plurality of sensor inputs, to determine a control action based upon said input and to send said control action to said at least one control action output, wherein said control action includes actions for immediate protection, wherein a control action to shut down said compressor is issued, and control actions for prognostic protection, wherein a signal indicating that maintenance is needed is issued while said compressor is continued to be operated.

2. The apparatus of claim 1, wherein said control member is adapted to receive input comprising compressor discharge pressure, compressor discharge temperature, compressor suction pressure, compressor suction temperature, oil pressure and a compressor on/off input signal.

3. The apparatus of claim 2, wherein said control member includes a memory storing a plurality of potential control actions, a plurality of adjustable operating parameters and a plurality of sensor input

value combinations corresponding to said plurality of potential control actions, and a processor adapted to compare said input to said sensor input value combinations and select said control action from said plurality of control actions.

4. An apparatus for monitoring a compressor, comprising:

a plurality of sensor inputs for receiving input regarding operating parameters of a compressor;

at least one control action output for sending a control action to said compressor; and

a control member communicated with said plurality of sensor inputs and said control action output, said control member being adapted to analyze input from said plurality of sensor inputs, to determine a control action based upon said input and to send said control action to said at least one control action output, wherein said control member is adapted to receive input comprising compressor discharge pressure, compressor discharge temperature, compressor suction pressure, compressor suction temperature, oil pressure and a compressor on/off input signal, wherein said control member includes a memory storing a plurality of potential control actions, a plurality of adjustable operating parameters and a plurality of sensor input value combinations corresponding to said plurality of potential control actions, and a processor adapted to compare said input to said sensor input value combinations and select said control action from said plurality of control actions, wherein said plurality of potential control actions includes a compressor shut down command, operation

parameter adjusting commands and commands indicating that maintenance is needed.

5. The apparatus of claim 4, wherein said control member is further adapted to store information regarding at least one of sensor input values, said control action and said commands indicating that maintenance is needed in said memory.

6. The apparatus of claim 3, further comprising a communication member associated with said control member and adapted to allow communication between said control member and a remote location.

7. The apparatus of claim 6, wherein said plurality of control actions includes a command to issue a signal through said communication member.

8. (withdrawn) The apparatus of claim 1, further comprising a display member communicated with said control member, said control member being adapted to display a message on said display member corresponding to at least one of said input and said control action, and an indication of at least one compressor shut down or maintenance alarms; and to allow adjustment of at least one of said adjustable operating parameters.

9. (withdrawn) The apparatus of claim 1, wherein said control member is adapted to identify a flooded start condition from said

input.

10. (withdrawn) The apparatus of claim 9, wherein said input includes suction temperature, suction pressure, discharge pressure, discharge temperature and oil pressure data, and said control actions include issuing a flooded start warning, altering an operating parameter of said compressor, shutting down said compressor, and combinations thereof.

11. (withdrawn) The apparatus of claim 1, wherein said control member is adapted to identify a liquid slugging condition from said input.

12. (withdrawn) The apparatus of claim 11, wherein said input includes suction temperature, suction pressure, discharge pressure, discharge temperature and oil pressure data, and said control actions include issuing a liquid slugging warning, altering an operating parameter of said compressor, shutting down said compressor, and combinations thereof.

13. (withdrawn) The apparatus of claim 1, wherein said control member is adapted to compare discharge temperature from said input to a discharge temperature set point and to control a liquid injection valve on said compressor based upon results of the comparison.

14. (withdrawn) An apparatus for monitoring a compressor,

comprising:

a plurality of sensor inputs for receiving input regarding operating parameters of a compressor;

at least one control action output for sending a control action to said compressor; and

a control member communicated with said plurality of sensor inputs and said control action output, said control member being adapted to analyze input from said plurality of sensor inputs, to determine a control action based upon said input and to send said control action to said at least one control action output, wherein said control member is adapted to compare discharge temperature from said input to a discharge temperature set point and to control a liquid injection valve on said compressor based upon results of the comparison, wherein said control member is adapted to open said liquid injection valve when said discharge temperature is greater than said set point.

15. (withdrawn) The apparatus of claim 13, wherein said control member has a memory storing expected reactions to control actions taken on said liquid injection valve, and wherein said control member is adapted to compare actual change in said discharge temperatures to said expected reactions so as to identify a malfunctioning liquid injection valve.

16. (withdrawn) The apparatus of claim 1, wherein said control member is adapted to identify a liquid floodback condition from said

input.

17. A method for monitoring a compressor, comprising the steps of:

obtaining input regarding a plurality of compressor operating parameters;

feeding said input to a control member;

analyzing said input with said control member to determine a control action based upon said input; and

carrying out said control action on said compressor, wherein said control action includes actions for immediate protection, wherein a control action to shut down said compressor is issued, and control actions for prognostic protection, wherein a signal indicating that maintenance is needed is issued while said compressor is continued to be operated.

18. The method of claim 17, wherein said input comprises compressor discharge pressure, compressor discharge temperature, compressor suction pressure, compressor suction temperature, oil pressure and a compressor on/off input signal.

19. The method of claim 18, wherein said control member includes a memory storing a plurality of potential control actions and a plurality of sensor input value combinations corresponding to said plurality of potential control actions; and wherein said control member selects said control action from said plurality of potential

control actions.

20. A method for monitoring a compressor, comprising the steps of:

obtaining input regarding a plurality of compressor operating parameters;

feeding said input to a control member;

analyzing said input with said control member to determine a control action based upon said input; and

carrying out said control action on said compressor, wherein said plurality of potential control actions include a compressor shut down command, operation parameter adjusting commands and commands for indicating that maintenance is needed, wherein said input comprises compressor discharge pressure, compressor discharge temperature, compressor suction pressure, compressor suction temperature, oil pressure and a compressor on/off input signal, wherein said control member includes a memory storing a plurality of potential control actions and a plurality of sensor input value combinations corresponding to said plurality of potential control actions; and wherein said control member selects said control action from said plurality of potential control actions, wherein said plurality of potential control actions include a compressor shut down command, operation parameter adjusting commands and commands for indicating that maintenance is needed.

21. The method of claim 19, further comprising the step of

storing information regarding at least one of said input and said control action in said memory.

22. The method of claim 17, wherein said input is obtained from sensors positioned within about 1 foot of said compressor.

23. The method of claim 17, further comprising the steps of enabling communication of said control member with a remote location, and at least one of (a) sending information related to said control action to said remote location and (b) allowing access to information regarding said control action from said remote location.

24. In combination, a compressor and control module system, comprising:

a compressor; and

a control module comprising a plurality of sensor inputs for receiving input from said compressor; at least one control action output for conveying control actions to said compressor; and a control member communicated with said plurality of sensor inputs and said control action output, said control member being adapted to analyze input from said plurality of sensor inputs, to determine a control action based upon said input and to send said control action to said at least one control action output, wherein said control action includes actions for immediate protection, wherein a control action to shut down said compressor is issued, and control actions for prognostic protection, wherein a signal indicating that maintenance is

needed is issued while said compressor is continued to be operated.

25. (withdrawn) The system of claim 24, wherein said control member is adapted to compare discharge temperature from said input to a discharge temperature set point and to control a liquid injection valve on said compressor based upon results of the comparison, and has a memory storing expected reactions to control actions taken on said liquid injection valve, and wherein said control member is adapted to compare actual change in said discharge temperatures to said expected reactions so as to identify a malfunctioning liquid injection valve.

26. The system of claim 24, further comprising a plurality of sensors associated with said compressor and connected to said sensor inputs.

27. The system of claim 24, wherein said plurality of sensors comprises sensors for measuring compressor discharge pressure, compressor discharge temperature, compressor suction pressure, compressor suction temperature, oil pressure and compressor on/off input signal.

28. The system of claim 24, wherein said control member includes a memory storing a plurality of potential control actions and a plurality of sensor input combinations corresponding to said plurality of potential control actions.

29. In combination, a compressor and control module system, comprising:

a compressor; and

a control module comprising a plurality of sensor inputs for receiving input from said compressor; at least one control action output for conveying control actions to said compressor; and a control member communicated with said plurality of sensor inputs and said control action output, said control member being adapted to analyze input from said plurality of sensor inputs, to determine a control action based upon said input and to send said control action to said at least one control action output, wherein said control member includes a memory storing a plurality of potential control actions and a plurality of sensor input combinations corresponding to said plurality of potential control actions, wherein said plurality of potential control actions include a compressor shut down command, operation parameter adjusting commands and commands for indicating that maintenance is needed.

30. The system of claim 28, wherein said control member is further adapted to store information regarding at least one of said input and said control action in said memory.

31. The system of claim 24 further comprising a communication member associated with said control member and adapted to allow communication between said control member and a remote location.

32. The system of claim 31, wherein said at least one control action includes a command to issue a signal through said communication member.

33. (withdrawn) The system of claim 24, further comprising a display member communicated with said control member, said control member being adapted to display a message on said display member corresponding to said control action.

34. (withdrawn) The system of claim 33, wherein said message includes a value of at least one sensor input, status of at least one control output and an indication of at least one compressor shut down or maintenance alarm.

35. (withdrawn) The system of claim 24, wherein the compressor has a compressor chassis and wherein the control module is mounted to the compressor chassis.

36. (withdrawn) The system of claim 29, wherein the compressor has a compressor chassis and wherein the control module is mounted to the compressor chassis.

37. The apparatus of claim 1, further comprising a system control box for receiving said control action from said control action output and for enacting the control action on the compressor.

38. The apparatus of claim 4, further comprising a system control box for receiving said control action from said control action output and for enacting the control action on the compressor.

39. The method of claim 17, wherein said step of carrying out said control action on said compressor comprises the steps of receiving said control action with a system control box for receiving said control action from said control action output, and carrying out said control action on said compressor with said system control box.

40. The method of claim 20, wherein said step of carrying out said control action on said compressor comprises the steps of receiving said control action with a system control box for receiving said control action from said control action output, and carrying out said control action on said compressor with said system control box.

41. The system of claim 24, further comprising a system control box for receiving said control action from said control action output and for enacting the control action on the compressor.

42. The system of claim 29, further comprising a system control box for receiving said control action from said control action output and for enacting the control action on the compressor.

(ix) Evidence Appendix - None

(x) Related Proceedings Appendix - None